

UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

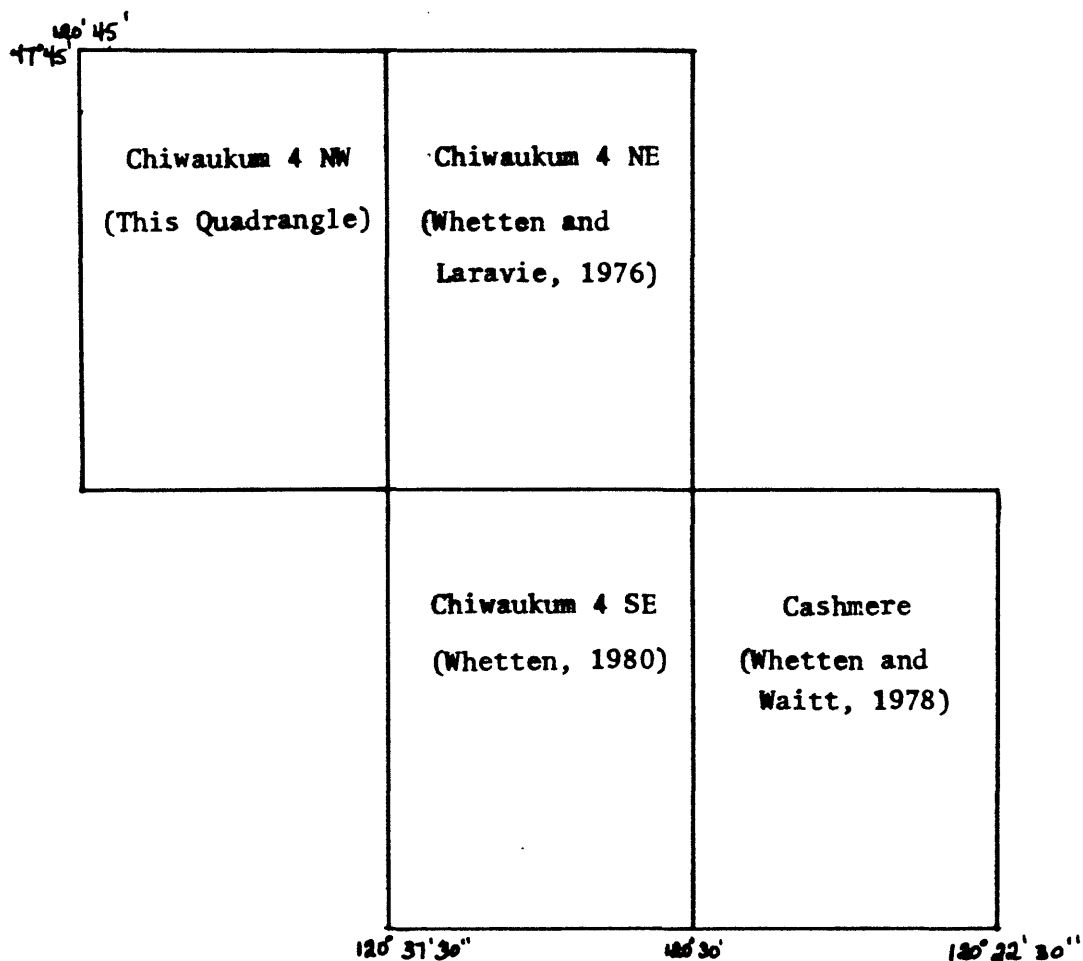
PRELIMINARY BEDROCK GEOLOGIC MAP  
OF THE CHIWAUKUM 4 NW QUADRANGLE,  
CHIWAUKUM GRABEN, WASHINGTON

By

John T. Whetten

Open-File Report 80-456

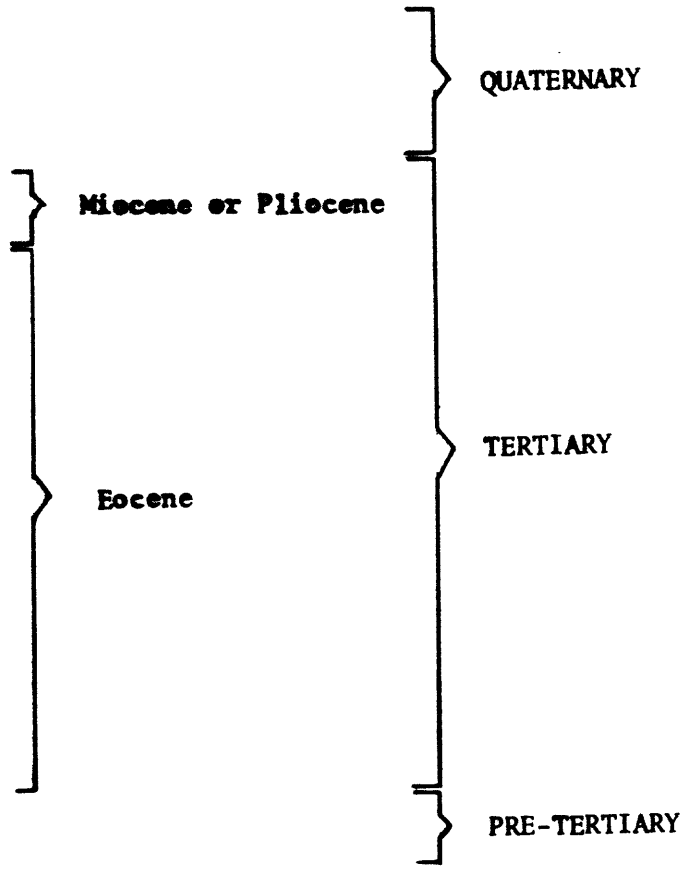
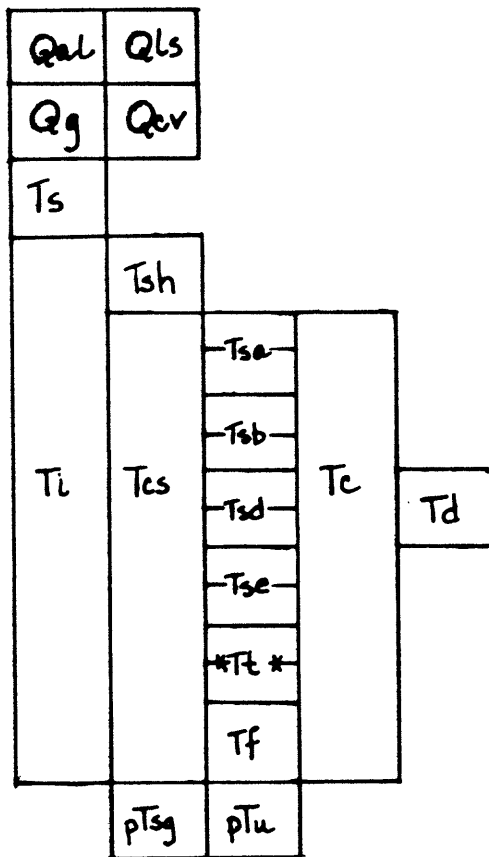
This report is preliminary and  
has not been edited or reviewed  
for conformity with Geological  
Survey standards or nomenclature



# INDEX TO GEOLOGIC MAPPING

Geologic mapping available on a scale of 1:24,000 in the Chiwaukum graben,  
Chelan County, Washington.

# CORRELATION OF MAP UNITS



## DESCRIPTION OF MAP UNITS

- Qal ALLUVIUM - Gravel, sand, and silt in channels and underlying floodplains of the Wenatchee River and tributaries. Unit also includes colluvium near valley margins.
- Qls LANDSLIDE DEPOSIT - Locally derived materials downslope from source-area scar. Arrow indicates general direction of movement.
- Qg GLACIAL DEPOSIT - Mostly bouldery deposit occurring in small patches on ridges dividing the drainage areas of Chumstick Creek and the Wenatchee River. Boulders are rounded, lithologically heterogeneous, and up to 1 m in maximum diameter. Unit also includes sand and gravel deposit near mouth of Eagle Creek that is probably a remnant of a moraine.
- Qcv COLLUVIUM OF VOLCANIC CLASTS - Derived from mass-wasting of unit Ts. Deposit consists primarily of rounded andesitic volcanic clasts with minor amounts of schist, gneiss, and silicic plutonic clasts. Found on ridge tops on SE side of Natapoc Mountain.
- Ts SUMMIT CONGLOMERATE OF PAGE (1940) - Massive to well-bedded sand and gravel overlying unit Tsh with angular unconformity; deposit originally described by Hougland (1932) occurs on twin summits of Natapoc Mountain and consists mostly of rounded clasts of porphyritic andesite underlain by schist, gneiss, granodiorite, and serpentinite. Unit was probably deposited by streams, but source of volcanic clasts is unknown. (See cover of Seattle telephone directory (Pacific Northwest Bell, 1979) for a photograph of SE side of Natapoc Mountain showing unit Ts on top of mountain, unconformably overlying unit Tsh).
- Ti INTRUSIVE ROCK - Commonly basalt or basaltic andesite.
- Tsh SANDY SHALE AND SANDSTONE - The Nahahum Canyon Member of the Chumstick Formation of Gresens, Naeser, and Whetten (in press), consisting of carbonaceous, micaceous, finely laminated fissile shale, interbedded with laminated sandstone and relatively rare pebble lenses. Crossbedding and sole markings present locally. The finer-grained parts of this unit are probably of lacustrine origin; the remainder may be fluvial.
- Tcs CONGLOMERATIC SANDSTONE - Main part of the Chumstick Formation of Gresens and others (in press), composed of thick-bedded, light colored sandstone beds, commonly channelled and cross-bedded with minor shale. Pebbles of dacite, Swakane Biotite Gneiss (pTsg), and rhyolite commonly occur near base of beds. Unit is thousands of meters thick. Mappable beds

of tuffaceous sandstone and tuff occur in this unit, generally as distinctive ridge-forming resistant beds 6 to 10 m thick. The tuffaceous materials commonly are altered to clinoptilolite, which causes the beds to weather in thin slabs subparallel to bedding. These units are shown by single lines on the map and are indicated as follows:

Tsa, Tsb, Tsd, Tse - TUFFACEOUS SANDSTONE

Tt TUFF - Coarse-grained, probably water-laid and reworked. Thickness ranges from 2 to 4 m. Fission-track (zircon) ages on three samples from the adjoining quadrangle to the east have been determined as  $48.8 \pm 7.2$  m.y.,  $42.7 \pm 5.1$  m.y., and  $41.9 \pm 6.8$  m.y. (Gresens and other, in press).

Tf FANGLOMERATE - Composed on angular clasts of Swakane Biotite Gneiss (pTsg) in a sandy matrix. Unit occurs adjacent to a small area of gneiss in core of Eagle Creek anticline.

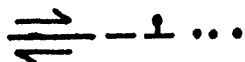
Tc CONGLOMERATE - Boulders, cobbles, and pebbles interbedded with sandstone. Unit trends parallel with Leavenworth fault and generally coarsens toward the fault. Clasts derived from unit pTu, and include schist, granodiorite, and quartz, with minor amounts of volcanic and gneiss pebbles such as are found in unit Tcs. Unit probably deposited by streams and debris flows on fans grading eastward from a highland west of the Leavenworth fault. Contact is gradational between units Tc and Tcs.

Td DIAMICTITE - Unsorted monolithologic breccia consisting of angular clasts of quartz diorite and granodiorite. Largest clast is about 7 m in maximum diameter. Unit is well-cemented and may have been deposited by a landslide or debris flow from unit pTu on west side of Leavenworth fault.

pTsg SWAKANE BIOTITE GNEISS - Fine- to medium-grained biotite-plagioclase-quartz-gneiss. Unit is exposed only in small area in core of the Eagle Creek anticline and is extensively brecciated.

pTu PRE-TERTIARY ROCKS, UNDIFFERENTIATED - Includes schist, granodiorite, quartz diorite, and serpentinite, and occurs on the west side of the Leavenworth fault.

----- ... Contact - Dashed where inferred; dotted where concealed.  
Thin tuffaceous sandstone and tuff beds are shown by a single line



Fault - Dashed where inferred; dotted where concealed.  
Ball and bar on downthrown side; arrows indicate  
inferred direction of movement on postulated  
strike-slip fault



Anticline - Showing crestline; dashed where approx-  
imately located, dotted where concealed



Syncline - Showing troughline; dashed where approx-  
imately located, dotted where concealed



Strike and dip of beds



Strike and dip of mineral foliation



Brecciated rock along fault zone NE of Eagle Creek  
anticline

## SELECTED REFERENCES

- Frizzell, V. A., Jr., 1979, Petrology and Stratigraphy of Paleogene nonmarine sandstones, Cascade Range, Washington: Stanford University, Ph.D. thesis, 151 p.
- Frizzell, V. A., Jr., 1979, Petrology of Paleogene nonmarine sandstone units in Washington: in Armentrout, J. M., Cole, M. R., and TerBest, H. (eds.), Cenozoic Paleogeography of the Western United States, Pacific Coast Paleogeography Symposium 3: Society of Economic Paleontologists and Mineralogists, Los Angeles, California, p. 113-118.
- Gresens, R. L., Whetten, J. T., Tabor, R. W., and Frizzell, V. A., Jr., 1977, Tertiary Stratigraphy of the central Cascade Mountains, Washington State: Geological Society of America Guidebook for 1977 Annual Meeting, Seattle, Washington, p. 84-126.
- Gresens, R. L., Naeser, C. W., and Whetten, J. T., in press, Stratigraphy and age of the Chumstick and Wenatchee Formations: Tertiary fluvial and lacustrine rocks, Chiwaukum graben, Washington: Geological Society of America Bulletin.
- Hougland, E., 1932, Eocene sandstone of Natapoc Mountain: Pan American Geologist, vol. 58, p. 263-270.
- Pacific Northwest Bell, 1979, Seattle (including Mercer Island) telephone directory 1979/80, 814 p.
- Page, B. M., 1939, Geology of a part of the Chiwaukum quadrangle, Washington: Stanford University, Ph.D. thesis, 203 p.
- Page, B. M., 1940, Geology of a part of the Chiwaukum quadrangle, Washington: Stanford University Dissertation Abstracts, vol. 15, p. 118.
- Whetten, J. T., 1980, Preliminary geologic map of the Chiwaukum 4 SE quadrangle, Chiwaukum graben, Washington: U.S. Geological Survey Open-File map, in press, scale 1:24,000.
- Whetten, J. T., and Laravie, J. A., 1976, Preliminary geologic map of the Chiwaukum 4 NE quadrangle, Chiwaukum graben, Washington: U.S. Geological Survey Miscellaneous Field Studies Map MF-794, scale 1:24,000.
- Whetten, J. T., and Waitt, R. R., Jr., 1978, Preliminary geologic map of the Cashmere quadrangle, Chiwaukum lowland, Washington: U.S. Geological Survey Miscellaneous Field Studies Map MF-908, scale 1:24,000.
- Willis, C. L., 1953, The Chiwaukum graben, a major structure of central Washington: American Journal of Science, vol. 251, p. 789-797.